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ABSTRACT

The management of waste materials has become more complex with the increase in human population and the development of new substances. This illustrated booklet traces the history of waste management and provides guidelines for individuals and communities in disposing of certain hazardous wastes safely. It addresses such topics as: (1) how people have learned to manage wastes; (2) new ways of life (new products and new wastes); (3) wastes that are considered hazardous; (4) toxic wastes; (5) asbestos; (6) toxic metals; (7) organic solvents; (8) acids and bases; (9) pesticides; (10) why the old ways of waste disposal don't work for some wastes; (11) what you can do at home (reduction and recycling); (12) what a community can do with collected wastes (treatment, incineration); (13) hazardous waste landfills; (14) what you can do for your community; and (15) suggestions for handling particular wastes. (TW)

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HAZARDOUS WASTES

from Homes

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The archaeologist's shovel turns up things people threw away thousands of years ago. Trash, rubble, bones, bits of broken pots—these tell the archaeologist what the people who lived here ate, what they wore, what they bought and sold, what sort of housekeepers they were.

Wastes are a record of people's way of life. From the wastes we leave behind, our great-great-grandchildren will learn what sort of people we were.

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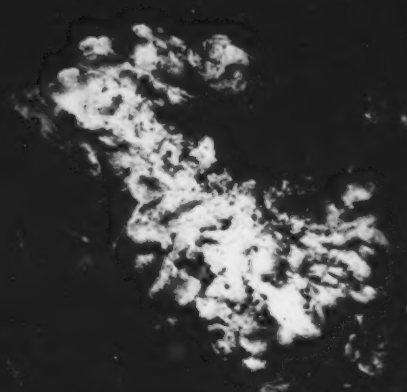
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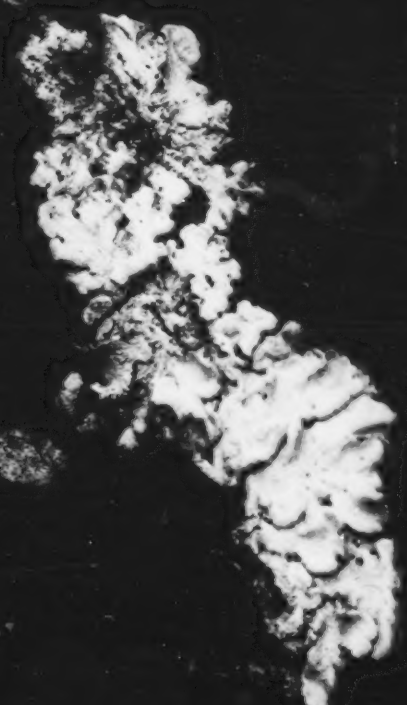


All living things make wastes.

Dead leaves litter the floors of forests. In nature such wastes are part of cycles. Bacteria and fungi break down the fallen leaves, and the material of which they were made becomes new trees.

People make wastes, and the wastes they make have always been a problem to them. Human feces spread human parasites, and in drinking water cause diseases like cholera. Garbage supports rats and insects that spread diseases like the Black Death.

But when people began to realize how serious a problem wastes could be, they started to look for solutions.



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How People Have Led

Though a few ancient civilizations worked out adequate ways of handling waste, for thousands of years most of humanity just suffered.

As cities grew and people were packed more closely together, the problem got worse. Then about 150 years ago systematic solutions to the waste problem began to be invented.

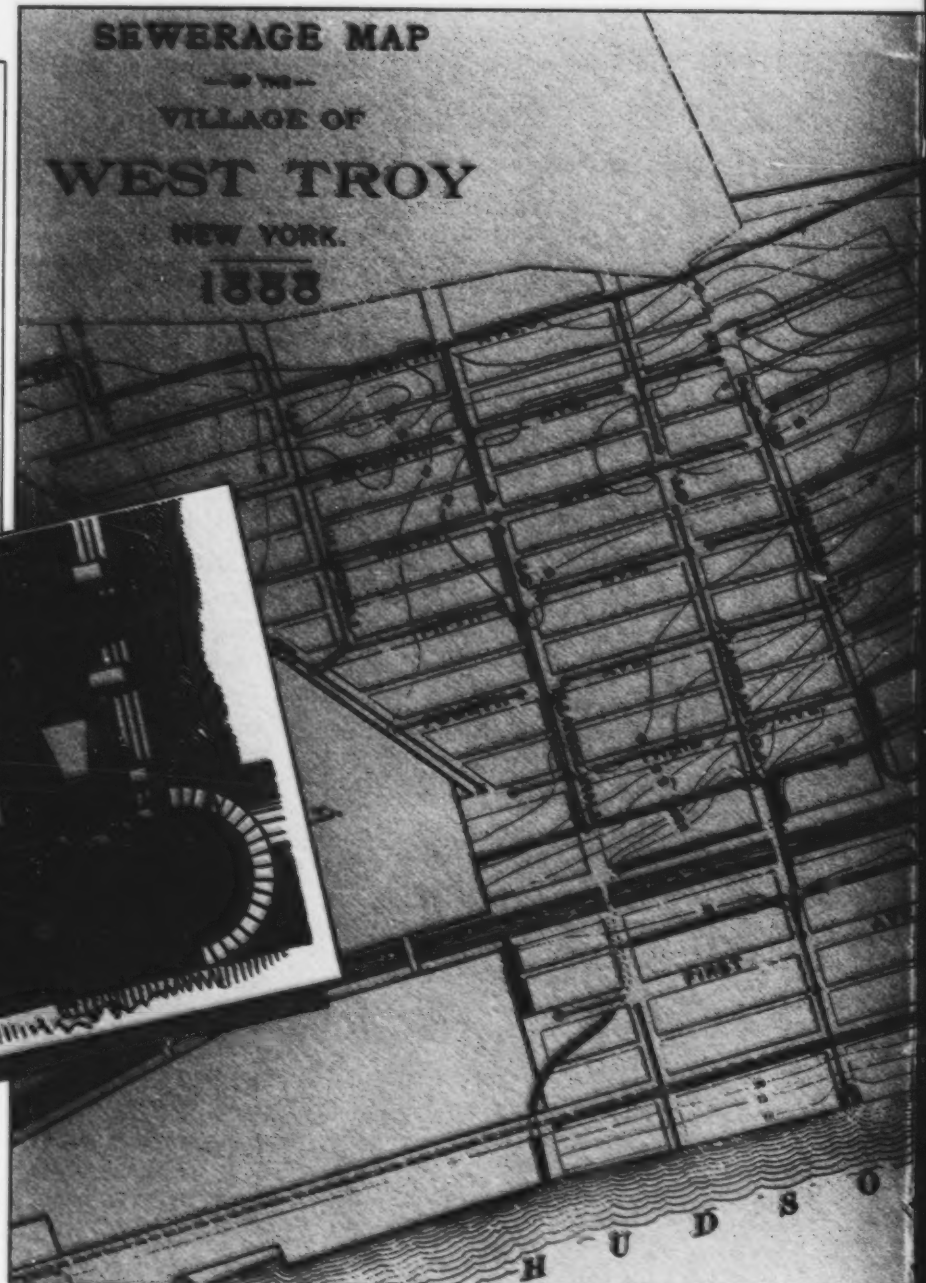
In city after city, the death rate fell when a sewage system was built.

Argument in favour of large sewers.



The first sewers simply carried wastes to rivers. In the 1880s, sewage treatment plants began to be built. Most sewage treatment plants are essentially bacteria farms. The living bacteria break down, or degrade, the wastes in the sewage. The result is sludge and wastewater containing nutrients, among other things. If necessary, modern multi-step treatment plants can even restore wastewater to drinking water quality.

The long and healthy lives Americans lead today are in part a triumph of a program of waste management begun by our great-grandparents. Some of the progress depended on inventions like flush toilets



and sewage treatment plants, but much of the improvement was due to a new public awareness of the need to manage wastes carefully. Today, no one would think of defecating in the street; in the seventeenth century that was not uncommon.

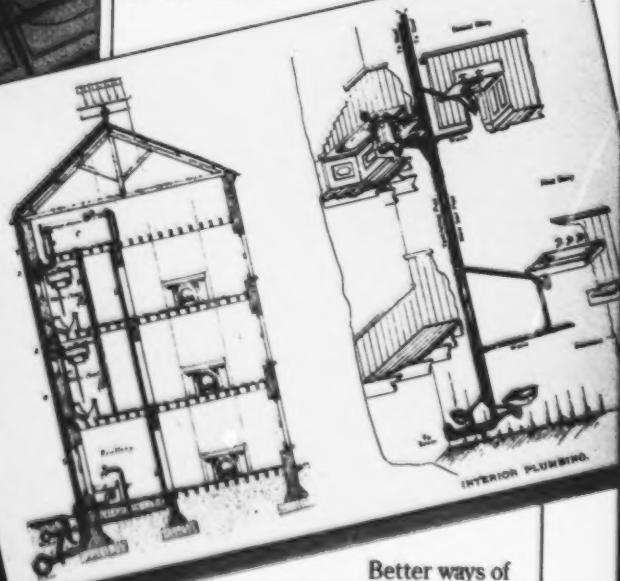
Regular systems to handle solid wastes like trash and garbage were also established by the early twentieth century. At first, wastes were simply hauled to

dumps outside the city (not too far outside, since transporting wastes was as expensive then as it is now). But there were problems. As cities grew they often overran old dumps. And dumps were smelly breeding grounds for disease-carrying flies and rats, places where smouldering fires might burn for days or months.

Learned to Manage Wastes

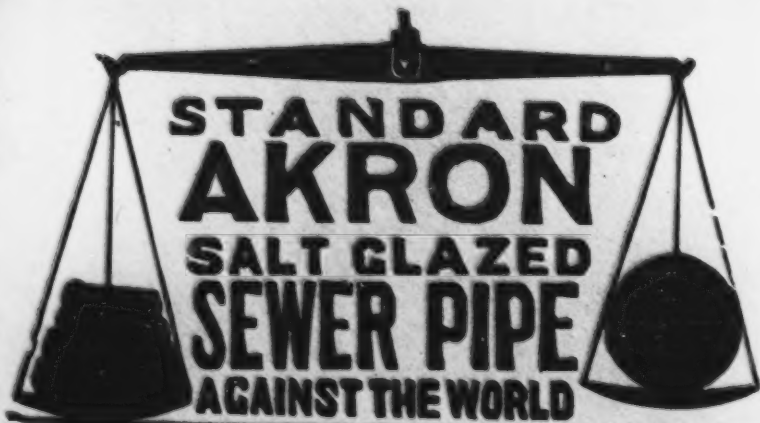
To overcome these problems, in 1916 a new kind of dump began to be built. It was called a "sanitary landfill." In a sanitary landfill, newly dumped refuse was covered with earth at least once each day. The blanket of earth prevented rats, odors, and fires.

Public health measures, not miracle drugs, are responsible for most of the improvement in our health since the 1800s.



Better ways of handling wastes have played an important role. Yet the problems of sewage and refuse management have not been solved once and for all. In the late 1960s, before federal regulations began to prohibit municipal dumps, 90 percent of all U.S. landfills were dumps, not sanitary landfills. Many towns lacked adequate sewers and sewage treatment facilities — mainly because waste treatment costs money, and some taxpayers weren't willing to pay the price.

The drain and the garbage truck — these are how most American families get rid of the things they no longer want. But these waste-handling systems cannot handle all modern wastes.



New Ways of Life: New F.

The sewage and garbage systems developed in the late 1800s and early 1900s were designed to handle the types of wastes people had produced for thousands of years, and to deal with the danger they were most aware of, which was infection. But in this century we have learned of other dangers, and the kinds of wastes families produce have changed, because the way we live has changed.

IN 1900, most clothing was made of wool, linen, or cotton. White clothes were washed in boiling water with soap. Today, most clothes contain synthetic fiber and are washed with detergent and warm water, which is flushed down the drain by an automatic washing machine. Thanks to synthetic fibers, many garments don't need ironing. If a garment can't be washed, there are dry cleaners everywhere.

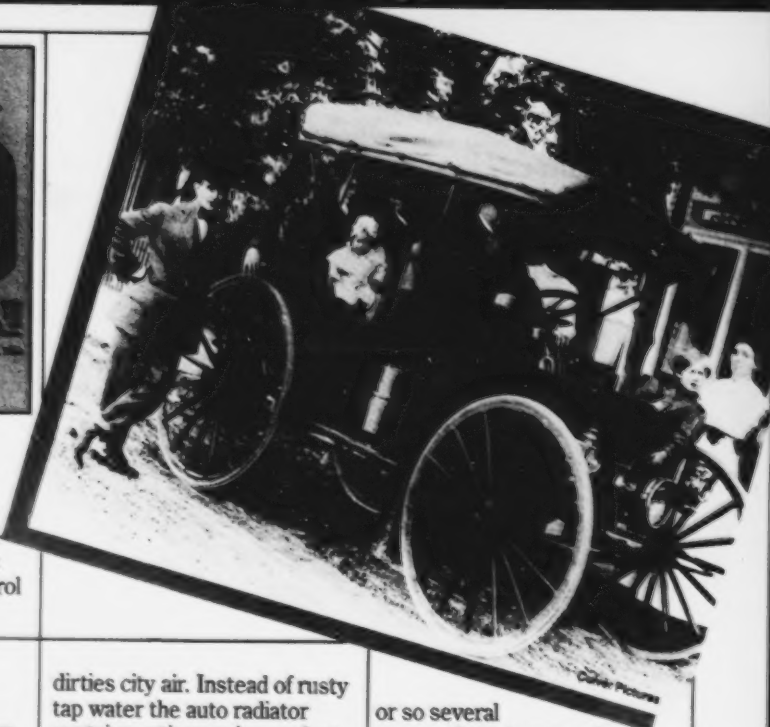


Products and New Wastes

IN 1900, elbow grease was the principal ingredient in home cleaning. Today, vacuum cleaners have replaced brooms, and consumers use a host of specialized, powerful cleaners: scouring powders with bleach, no-wax floor cleaners, detergent for washing walls, oven cleaners, toilet bowl cleaners, furniture polish. Chemicals are doing jobs formerly done by people.



IN 1900, careful house-keeping was needed to keep pests like fleas, lice, and bed bugs at bay. Today, synthetic insecticides are used to control such pests.



IN 1900, in the whole country there were fewer than 8,000 automobiles, and carrying horse manure out of cities was one of the biggest waste management problems. By 1940, horses were rare in cities, Americans owned 27 million autos, and a good set of rubber tires lasted 10,000 miles. Today, most families have an automobile, and 40,000 miles on a set of synthetic rubber tires is common. Air pollution from auto exhaust

dirty city air. Instead of rusty tap water the auto radiator contains anticorrosion coolant (which is flushed every other year), and every 5,000 miles

or so several quarts of used motor oil must be disposed of.



IN 1900, most people with a serious infection died. Today medicines cure most infections. Many bathroom cabinets are overflowing with medicines (many of them expired!) whose powers would astound a turn-of-the-century doctor.



New Ways of Life: New Products and New Wastes

The changes since 1900 in the way we live reflect a rising standard of living; our affluent society uses more of almost everything. They also reflect the development of new technologies, especially since World War II.

Every American household uses materials that householders didn't have a hundred years

ago: not just "chemicals" like medicines and insecticides, but also shampoo, stainless steel, polyester cloth, detergents, plastics, paint, synthetic rubber tires, caulk, glue, new kinds of ceramics — the list goes on and on. When their useful life is over, these materials become waste, new kinds of wastes that didn't exist in 1900.



1900

Olds Company begins first mass production of autos

1903

Wright brothers' first flight

1905

Novocain invented



1906

*Federal Food and Drug Act
Radio tube invented*

1908

First model T Ford



Electric iron and toaster patented



1909

First permanent waves in hair salons

1910

*First commercial production of rayon
Electric washing machines marketed*

1914

*Celluloid
Zippers become popular*



1915

*Activated sludge sewage treatment process
Turn-to-raise lipstick case invented
First motion picture serials
First transcontinental phone call*

1916

Electric clocks introduced

1917

Synthetic indigo dye sold (the blue of blue jeans)

1918

Rubbing alcohol made from petroleum

1921

Rayon becomes an important fiber

1922

Tetraethyl lead added to gasoline to increase octane

First sponsored radio program (WEAF, New York)

1923

*Bulldozer invented
Jacob Schick patents the electric shaver*

1925

*Commercial chrome plating
First air-conditioned theatres
Electric coffee percolators first marketed*

1928

First scheduled TV broadcasts (WGY, Schenectady)

1929

Coin-operated vending machine patented

1931

*Neoprene rubber
Fiberglass*

1934

First major laundry detergent marketed

1935

First full color Technicolor movie

1936

*Sulfa drugs
First major league night baseball game*

1938

Nylon first sold, as toothbrush bristles



Fluorescent lamps marketed

Polystyrene plastic marketed

Ballpoint pen invented

1939

DDT found to be an insecticide

Many of these new materials don't exist in nature. That can be part of their usefulness; plastics would be less valuable for many purposes if they rotted or spoiled. Unlike dead leaves, most plastics are not recycled naturally.

Soap is easily broken down by bacteria, but detergents resist being degraded. By 1953, the

United States was producing more detergent than soap. Persistent rafts of foam began to appear on some streams as undegraded detergent found its way into wastewater. Around 1964, U.S. detergent manufacturers switched to a different kind of ingredient, one that bacteria could break down more easily.



1940

Nylon stockings widely sold
First regular passenger air service across the Atlantic

1941

Penicillin first used on a human patient
FCC authorizes TV broadcasting



Aerosol spray cans introduced

1943

Streptomycin discovered
Polyethylene plastic

1944

Silicone resins marketed

1945

FCC sets aside 13 commercial TV channels

1947

Instant photos introduced

1948

Transistor invented
LP records introduced
Aureomycin and chloromycetin developed

1949

Commercial production of ACTH
Neomycin

1951

First commercial color TV broadcast
First computers that weren't made one-by-one

1953

Transistorized hearing aids marketed
Detroit's first all-fiberglass car body
First U.S.-made polyester fiber

1954

Salk polio vaccine
Plastic contact lenses introduced

195x

Transistor radio marketed



1955

First commercial jet transport, De Havilland Comet

1957

First artificial satellite (Sputnik I)
First U.S. commercial nuclear power plant

1958

Stereo LPs introduced

1959

First Xerox machine sold
Spandex elastic first sold

1961

Introduction of olefin fiber makes indoor-outdoor carpet possible

1962

Birth control pills first sold
Birth defects traced to thalidomide
Integrated circuits first marketed



1963

The Beatles
Instant color film

1964

Permanent press clothes marketed
Switch to biodegradable detergents

1965

First home videotape recorder

1969

First man on the moon



1970

No-wax vinyl flooring introduced

1972

DDT banned in the U.S.

1973

First oil price shock

1975

First digital home computer in the U.S.
Permanent press process for 100% cotton

1976

Fluorocarbons banned as aerosol propellants
Tris flame retardant banned

1979

Second oil price shock

1986

Genetically-engineered bacteria for field use

Some of the new kinds of wastes can injure living things—some to the point of being life-threatening. Such wastes are called ‘hazardous wastes.’ People have always produced hazardous wastes, but in the twentieth century the amount and variety have greatly increased.

The term ‘hazardous waste’ has a legal meaning; it doesn’t cover every kind of waste that needs careful management. Cities may worry about nondegradable packaging filling up their landfills, but such packaging is not hazardous waste. Small children have died as a result of improperly discarded refrigerators or plastic bags, but a discarded refrigerator is not ‘hazardous waste.’ A hazardous waste is a discarded substance whose chemical or biological nature makes it potentially dangerous to people.

In 1976, Congress passed a law that required the Environmental Protection Agency to define hazardous waste. The EPA named several different characteristics that would make a waste hazardous:

Some wastes are poisonous, or can cause cancer, birth defects, or other health problems. These wastes are called ‘acute’ wastes.

GASOLINE

In addition to listing the characteristics that make a waste hazardous, the EPA was required to create a list of particular hazardous substances. By 1985, there were more than 300 substances on that list. Any waste containing one of the substances on the list is regarded as hazardous and is regulated.

A few kinds of wastes are excluded by other federal laws, such as the Clean Water Act.

Some wastes are infectious, like sewage. Hospitals produce infectious wastes and, very rarely, a household may. (In such cases the doctor or local public health department tells the family how to deal with the wastes.)



Radioactive wastes can cause illness. It's unlikely a home would ever have highly radioactive waste to dispose of, but wastes that are only mildly radioactive, or very dilute, can also increase a person's chances of developing cancer if they are eaten or inhaled. For example, some wastes from nuclear power plants are mildly radioactive.

Hazardous wastes must be handled in ways that prevent them from reaching dangerous concentrations in the environment—they need to be kept out of groundwater, for example. We can manage hazardous wastes by reducing the amount of waste we produce, by recycling wastes, by treating them to make them nonhazardous, and, as a last resort, by placing them in specially designed sealed landfills. Any good hazardous-waste management system will also prevent people from coming in contact with the wastes while they are being handled. For example, we don't want neighborhood children or garbage collectors to be injured by what we put in garbage cans.

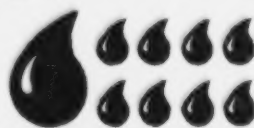
Systems to manage hazardous wastes already exist; they were developed to handle wastes generated by industry. We know now that many of the older systems were inadequate, because experience has shown they did allow unacceptable amounts of waste to escape into the environment. In the last ten years, however, major improvements have been made. New waste-handling technologies have been invented, regulations have become stricter, enforcement is improving, and perhaps most important, more people know that wastes are a serious problem.



Some wastes are classified as hazardous because they are toxic. A substance is toxic if it harms people when enough of it enters the body ('enough' must not be such a huge amount that it is unreasonable to expect a person to take in that much). The harm can be death, at one extreme; at the other extreme it can be symptoms so subtle that the person doesn't notice them—even a physician might not notice them during a routine examination.

Toxic substances differ in their effects on people. A full description of the toxicity of a substance relates symptoms to . . .

. . . the amount of the dose (or doses), and their timing;



. . . whether the substance was inhaled, ingested, or absorbed through the skin;

. . . the age, weight, and sex of the exposed person;



. . . and a host of other factors. All of these have a role in determining whether the substance can harm someone, and what the effects would be.

Too Much

Acute exposure to a toxic substance occurs when an individual gets a big dose of it over a short period of time: for example, if pets drink radiator coolant, or children swallow pills fished out of the garbage can, or someone eats food that has been stored in an old insecticide container. It is what people usually mean when they talk about a poisoning. "Acute toxicity" means toxicity resulting from exposure over a short period of time. Poisons are substances with a high acute toxicity; there are other toxic substances with low acute toxicities.

For every toxic substance there is a single dose large enough that it will be fatal—a lethal dose. But there is also a single dose small enough that it will produce no observable symptoms—there may be an effect, but there is no way to detect it. For example, ethanol (the alcohol in alcoholic drinks) is a toxic substance. If a large group of 180-pound men each drank a pint of ethanol in a single swig, half of them would be likely to die. Drinking a single drop would produce no detectable effects. If each of the men ate half a pound of table salt, half of them would probably die. Some substances, like vitamin A and selenium, are essential in trace amounts in the diet for good health, but acute exposure to larger amounts can cause illness or death.

Ethanol and table salt have low acute toxicities, because it takes such a big quantity to produce an effect. Certain insecticides are examples of commercial substances with high acute toxicities. Eating a drop of parathion is enough to kill a grown man; a much smaller quantity would be lethal to a child.

Too Much Too Often

Chronic exposure to a toxic substance occurs when a person is repeatedly exposed to the substance over a period of time. Usually these exposures are to small amounts. For example, people can suffer chronic exposure to a toxic waste if it has been allowed to pollute their drinking water, food, or air. One of the major goals of hazardous-waste management is to make such chronic exposures as small as possible.

Chronic exposure to some substances can result in serious illness, even though a somewhat higher acute exposure to the same substance may not produce serious effects. For example, most healthy adults would survive if they accidentally ate a quantity of the insecticide Mirex about the size of a pencil eraser. But eating half this much every day for a number of years would have serious health consequences, and might even be fatal. (Other substances, such as cyanide, have high acute toxicities and low chronic toxicities—the body can detoxify small doses of many such substances.)

The symptoms produced by chronic exposure to a substance are usually not the same as the symptoms produced by acute exposure to the same substance. For example, acute exposure to certain solvents produces symptoms involving the nervous system, while chronic exposure often leads to liver damage.

Like acute exposure, the effect of chronic exposure depends on the size of the dose—but it also depends on the frequency. Again taking alcohol as an example: A person whose consumption of alcohol is limited to an occasional glass of wine is not likely to develop any permanent observable ill effects. If the same person drank a liter of wine every day of his adult life, he would be likely to develop liver damage and other symptoms.

Estimating the size of the smallest regularly repeated dose that will cause observable symptoms in most people is the job of toxicologists. One way of doing this is by conducting laboratory tests on animals. A toxic substance often has different effects on different species, however, so tests on animals can't exactly predict the effects on people. To supplement their work with animals, toxicologists also study what happened to people who were exposed to the substance in their work or as a result of accidents. Because of all the uncertainties involved, to be on the safe side toxicologists are usually very conservative in their estimates.

Describing Chronic Doses as Concentrations

Except for people whose jobs involve working with toxic wastes, chronic exposure to toxic wastes usually occurs because of pollution of food, air or water. In such cases, a useful way of describing the size of the smallest dangerous dose is to say what percentage of the food, air, or water could be a particular toxic substance without giving a person a large enough dose to cause symptoms. Because the numbers are so small, instead of percentages concentrations of toxic substances are usually given in parts per million (ppm) or parts per billion (ppb). One part per million is the same as 1/10,000 of 1 percent.

Government agencies use concentrations to describe acceptable limits for the presence of toxic substances in drinking water, food, or air in the workplace. For example, the government set a standard for mercury in seafood of 1/2 part per million. A standard of 5 ppb for carbon tetrachloride in drinking water has been proposed.

Extremely toxic substances, like certain dioxins, dictate very low concentrations. In one case, the U.S. Center for Disease Control said that a concentration of 1 part per *billion* of the dioxin 2,3,7,8-TCDD in soil was cause for concern.

Testing for Toxic Substances

Testing food, air, and water for toxic substances is a very valuable public health tool. But there are some things testing can't do.

Testing doesn't usually reveal the presence of substances the tester isn't looking for. When health agencies test water, for example, they must decide what substances they are looking for *before* they do the test. A substance that does not appear in the list of test results might still have been in the water sample—the test methods used were not designed to detect it. It is not practical to test every sample for every possible toxic substance; the cost would be astronomical.

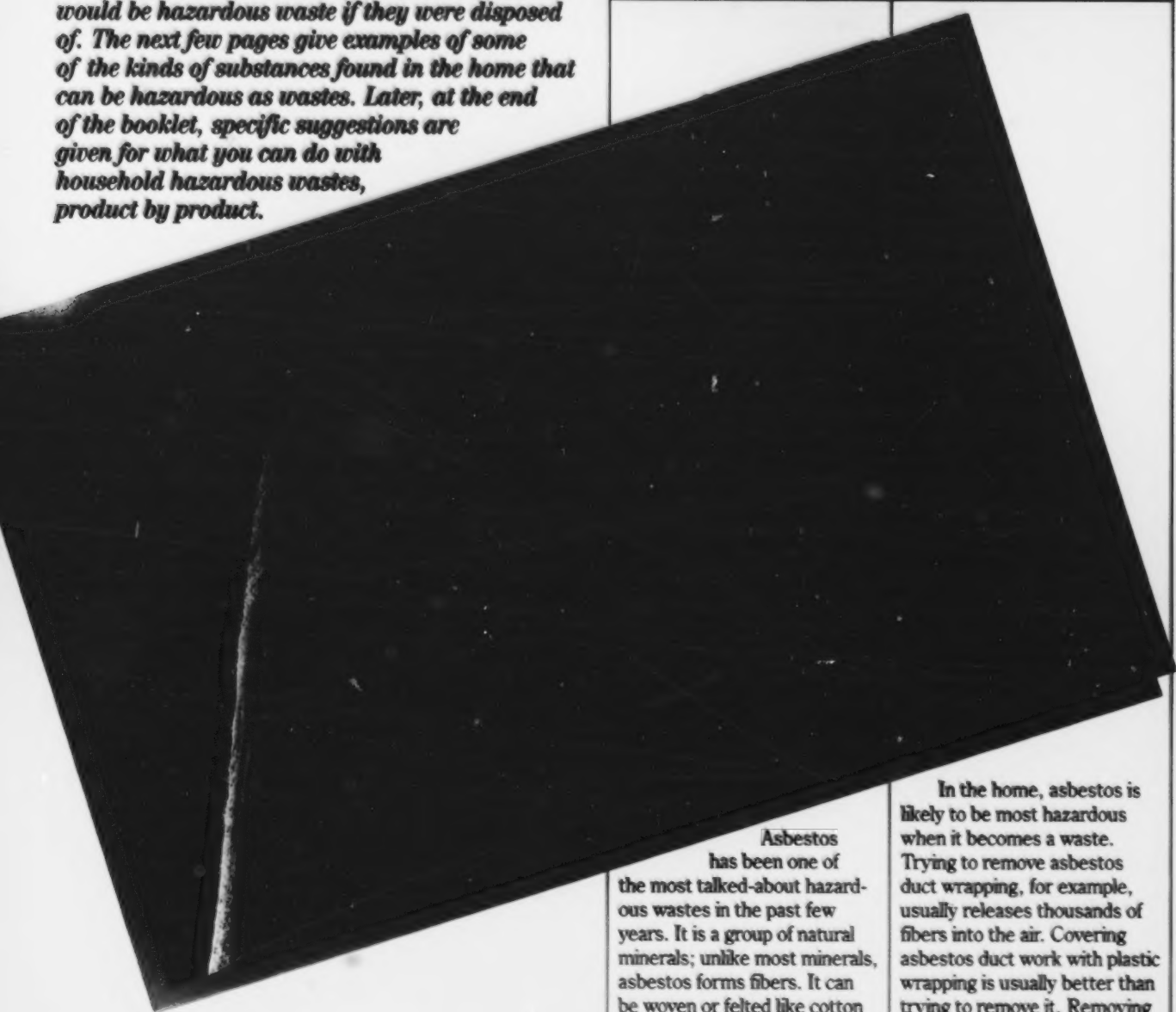
For every analytical test there is some concentration below which that method cannot detect the substance. This concentration is called the method's *limit of detection*. Suppose, for example, an analytic method for some substance in water has a limit of detection of 0.04 ppm. Using this method a particular water sample is tested, and none of the substance is detected. The sample might have had none of the substance at all, or it might have had almost 0.04 ppm; the test can't say.

A few decades ago, the best available tests could detect many substances at a concentration of 1 part per million. Newer methods and equipment can find a greater variety of substances, some in concentrations as low as 1 part in a

quadrillion (a billionth of a part per million!). The more sensitive tests make it possible to trace the movement of long-lasting wastes in the environment, but they also make it harder to decide what the results of the tests mean. It is becoming increasingly easier to find almost anything anywhere, *at some level of concentration*. We now have to decide not only which substances need to be watched, but also what concentration is a danger signal.

For many substances, zero levels in the environment are impossible to attain. Toxic substances like mercury and lead are present almost everywhere from natural sources, even without human additions. (*Just because a substance occurs naturally doesn't mean it isn't a problem.*) Monitoring background concentrations of such substances gives us a way of discovering when a dangerous release of such a waste into the environment has occurred.

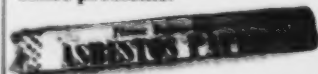
Almost every home contains materials that would be hazardous waste if they were disposed of. The next few pages give examples of some of the kinds of substances found in the home that can be hazardous as wastes. Later, at the end of the booklet, specific suggestions are given for what you can do with household hazardous wastes, product by product.



Asbestos has been one of the most talked-about hazardous wastes in the past few years. It is a group of natural minerals; unlike most minerals, asbestos forms fibers. It can be woven or felted like cotton or wool, but does not burn. For years asbestos was used as an insulator on home heating system ducts, in floor tiles, boards, and shingles, in ironing board covers, even in hair dryers. Today the use of asbestos in such products is restricted by law.

Asbestos is hazardous, because the tiny fibers can cause lung disease if a person inhales enough of them.

In the home, asbestos is likely to be most hazardous when it becomes a waste. Trying to remove asbestos duct wrapping, for example, usually releases thousands of fibers into the air. Covering asbestos duct work with plastic wrapping is usually better than trying to remove it. Removing asbestos IS NOT a do-it-yourself project. Professional asbestos removers wear spacesuit-like garments and carefully pack the waste asbestos in airtight plastic bags. These are taken to a landfill. Asbestos doesn't dissolve in water or react with many substances, so as long as it is buried under a layer of soil in a regulated landfill it will not cause problems.



Many of the metallic chemical elements are toxic, though they are also often extremely useful. People have been extracting some of these metals from their ores for thousands of years.

The silvery liquid inside fever thermometers is the metal mercury. No other material is so well suited for this use. Large quantities of mercury are also used in one kind of barometer, but most household barometers do not contain mercury. Very small quantities are found in fluorescent lights, some switches, and in the mercury batteries used in some watches, cameras, hearing aids and smoke detectors.

Mercury and most of the compounds containing it are toxic substances. Birth defects occurred when Japanese mothers regularly ate seafood from a bay contaminated with mercury. When a thermometer breaks or a mercury battery burns out, the mercury becomes a household hazardous waste.



Arsenic is also a metal, but the pure metal has no uses in the home. In the past, the most common pesticide in farms and gardens was lead arsenate, but it has been almost entirely replaced by synthetic pesticides. In a household, arsenic compounds may be found in medicine, rat poison, and plant killer, although for these uses it is also being replaced by synthetic materials. (Chemical elements like arsenic cannot be broken down into nontoxic substances. The synthetic substitutes are compounds and they can be broken down into simpler compounds, though it may take a long, long time under natural conditions.)



Lead is another toxic metal. A lead compound was once the most common pigment in house paint, and some small children suffered brain damage from repeatedly eating paint chips containing lead. Since 1940, nontoxic pigments have replaced lead in paints made for home interiors. A lead compound has also been added to gasoline to improve its octane rating; this use is also being phased out.



Cadmium is a toxic metal used to rustproof metal. Bolts and screws are often plated with cadmium. (Once ice-cube trays were coated with cadmium, but this is no longer done.) Most rechargeable flashlight batteries contain cadmium. Like lead, cadmium is used in some paint pigments, mainly yellows and oranges.



Although many of these metals have been used for centuries, a modern industrial economy uses more of them per capita than people did in the past.

Since the toxic metals are chemical elements they cannot be broken down by any biological or chemical process. Wastes containing these metals can sometimes be recycled: the element is recovered for reuse, as the lead in old car batteries is. If the waste is not recycled, it must be managed to limit the amount that living things inhale, ingest, or absorb through their skin, because almost any substance containing these elements is toxic.

A solvent is a substance in which other substances can be dissolved, as sugar dissolves in water. Water is the best known solvent. However, many substances that don't dissolve in water will dissolve in other solvents.

Vitamin E, for example, won't dissolve in water, but it does dissolve in fats and oils.

Ethanol, the alcohol in alcoholic drinks, is used as a solvent in products as different as cough syrup and liquid dishwashing detergent.

In dry cleaning, clothes are immersed in a solvent that dissolves away grease, oil, and many other substances.

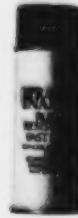
A hundred and fifty years ago only a few solvents were available and they were expensive, partly because of the cost of the raw materials from which they were made. Agricultural crops were fermented to make alcohol, for example, and turpentine was distilled from pine sap. Today solvents are plentiful, many are cheap, most are made from petroleum, and hundreds of different kinds are commercially available.

An amazing variety of products in the home contain solvents made from petroleum. Some products are almost 100 percent solvent: nail polish remover, paint thinner, and dry-cleaning fluid, for example. Solvents made from petroleum are a major ingredient in some kinds of paints, polishes, glues, and adhesives.

Different solvents have different properties, but many of them are hazardous if improperly disposed of. Most of them burn, and some are highly flammable. They evaporate easily and the fumes may be toxic. Some of them can be absorbed through the skin, and may even carry other substances into the body with them. Repeated exposure to some solvents increases a person's risk of developing cancer. Because solvents are liquids, they can flow from place to place, carrying dissolved substances with them—perhaps toxic ones. All of these characteristics make it important to dispose of surplus or used solvents properly.



For example, most people have cleaned a paint brush in paint thinner. What do you do with the thinner once the brush is clean? If you put the thinner in the trash, it may create a fire hazard on the truck. In a dump, the thinner may flow down into the earth and contaminate groundwater. Burning the thinner can release microscopic particles of paint pigment into the air,



and some pigments are highly toxic. If you flush the thinner

down the drain, the sewage treatment plant may not be able to handle it, and it will be discharged into the wastewater stream and may end up in the drinking water of someone downstream. (One thing that can be done is to let the particles of pigment settle out, pour off the thinner, and re-use it. Industries that recycle waste could refine the thinner for re-use, or burn it—but this isn't possible at home.)

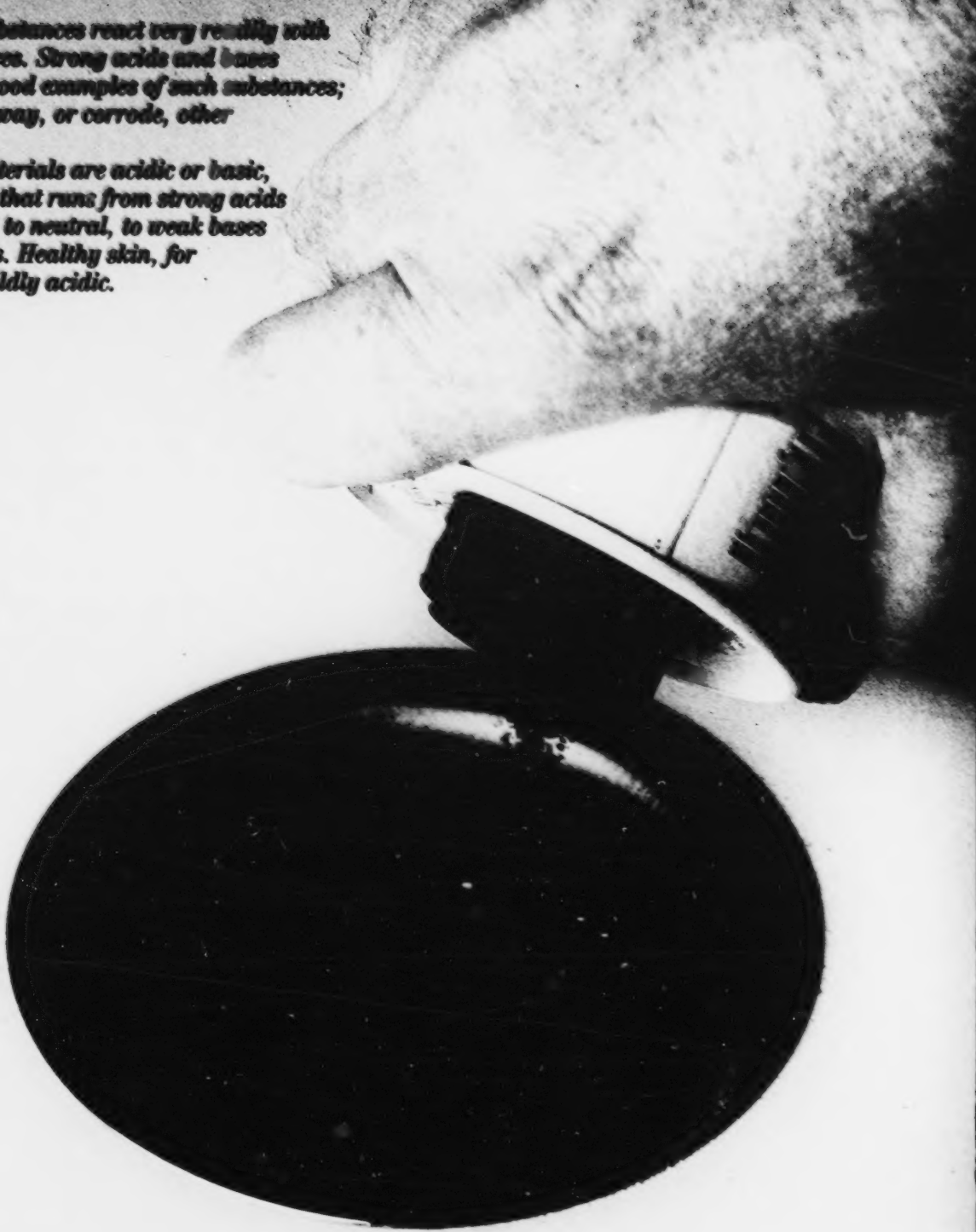
As time has passed, people have gained more experience with modern solvents, and have started to identify potential problems. Safer solvents are replacing the more hazardous ones of the not very distant past. Carbon tetrachloride, for example, was once used in home cleaning fluids and fire extinguishers for the home.

Now we know it is toxic, and it is no longer sold for home use.



Some substances react very readily with other substances. Strong acids and bases (alkalis) are good examples of such substances; they can eat away, or corrode, other substances.

Many materials are acidic or basic, along a range that runs from strong acids to weak acids, to neutral, to weak bases to strong bases. Healthy skin, for example, is mildly acidic.





Like most materials, acids and bases are rarely encountered 100 percent pure. They are diluted by being mixed with other materials – often with water. How corrosive an acidic material is depends both on the strength of the acid and on how concentrated it is.

Most acids found in the home are weak, but dilute strong acids are found in a few household products. Vinegar and lemon juice contain weak acids.

Some tub and tile cleaners and toilet bowl cleaners contain either a weak acid or a dilute strong acid; the acid in such products is used to remove mineral deposits. Relatively undiluted strong acids found in the home are the acid in car batteries and the acid used to etch masonry.



Bases are the chemical opposites of acids. They too can be very corrosive and, like acids, they also vary in strength and concentration. Lye (sodium hydroxide) has been the commonest strong base in the home for hundreds of years. Today lye is found in some oven cleaners and drain cleaners, and even in some cosmetics. Ammonia is also a base, weaker than lye.

As wastes, strong acids and bases are hazardous because they can burn skin, eyes, and lungs, and because they react with other wastes. Sometimes the products of such a reaction are themselves dangerous.



When an acid is mixed with a base they react, often violently. Such reactions are known as neutralization reactions, and at waste treatment plants – but not at home – they can be used to make corrosive wastes harmless. If the right combination of acid and base is chosen, the

products of the reaction will not be hazardous. In a large sewage system, neutralization reactions go on within



the sewers which makes the drain safer than the garbage can for disposing of small quantities of dilute acids or bases. Such wastes are likely to have been rendered harmless long before they reach the sewage treatment plant.

Some living things are not welcome in our households: rats, insects, fungus in the wood framing, germs in the bathroom, weeds in the driveway.

The rodenticides, insecticides, wood preservatives and fungicides, disinfectants, and herbicides used to kill these unwanted organisms are different types of pesticide.

The value of pesticides lies in their toxicity to living things we want to get rid of.

Any product that claims to be a pesticide must have a label approved by the EPA. The label contains directions for the use of the product and often for the disposal of the container. Not following those directions is a violation of federal regulations.

Some pesticides break down very quickly after they are applied. Others are longer lasting, or more *persistent*. Pesticides based on arsenic, for example, are very persistent. Decades ago, when chemists first began to design synthetic pesticides, they tried to make long-lasting molecules so that fewer applications and less pesticide would be needed. Now chemists try to design pesticides that are quickly degraded and affect only a few species.

Some slowly degradable substances may be stored by plants or animals in their tissues—DDT, for example, is stored in fat. In the environment, a persistent pesticide may be passed from one living thing to another. Plants in a lake may take up DDT from the lake water. Minnows get the substance by eating the plants or by absorbing it through their gills. Bass eat minnows. Finally, a fisherman gets the substance by eating the bass.

A slowly degradable substance can be passed along a food chain, from eaten to eater.

In some cases, living things concentrate the substance. A clam's body may have more parts per million of a pesticide than the water does, and a clam-eating bird will have a greater concentration than the clam. In this way, a pesticide can become more and more concentrated, and though very dilute in the environment can reach toxic levels in the bodies of some animals. DDT, for example, reached toxic levels in the bodies of fish-eating birds, which is one reason why most uses of DDT are illegal in the United States.



Do You Discard Household Hazardous Waste?

Take a moment now to get an idea of the kinds and quantities of possibly hazardous wastes produced in your own home. Turn to page 30, where you will find a list of products which, as leftovers, are hazardous wastes. Put a checkmark in the box next to any items that you have ever put in the trash or poured down the drain, and any that you expect you'll be discarding in the future.

Since two products sold for the same use can be made of different ingredients, not all products that fall into these categories are hazardous as wastes. This list is only suggestive.



If only one family in the United States were producing the kinds of hazardous wastes we have described, the country would have no problem. But almost every one of the 82 million households in America produces such wastes. The average person produces about a ton of waste in his or her home. No other



Reduce the Amount of Hazardous Waste

Like garbage, sewage, or any other kind of waste, the less hazardous waste you have, the easier it is to deal with it.

Recently many industries have greatly reduced their production of hazardous wastes, in part because new regulations greatly increased the costs of disposal.

Homes can also cut down on the amount of hazardous waste they produce.

can become hazardous leftovers (and what can be done with them). Sometimes you can switch to an equally effective product that does not produce a hazardous waste.

Except for medicines and certain pesticides, if you do end up with more of a product than you need, give the leftovers to someone who can use it up—in the original container, with the original label. If there were any precautionary notices on the box or on leaflets in the box, pass those on too. *Never create*



In the store, read the label before you buy a product. Make sure it will do what you want. Whenever you buy a product, you take on a responsibility to use and dispose of the product properly.



Don't buy more than you need. That way you won't need to dispose of surpluses.



Learn to recognize what types of products

REFUL

IRING OIL

unlabeled containers of hazardous waste.



Whether or not the containers are labelled, never repackage hazardous wastes in containers whose shapes suggest the contents are edible. Children have died from drinking substances that were stored in empty soft drink bottles.



Read and follow the label's directions on how to use the product and dispose of

the container. There's a good reason when labels say:

Do not refill this container.

Do not incinerate.

Do not mix with bleach.

The manufacturers of the product put the messages there to protect you and the environment. The law often requires such notices. Do your part by following them.

Suppose, however, you already have some hazardous waste that you can't use yourself and can't give to someone else to use. What can be done with it?

Recycle Wastes

Recycling is an excellent way of handling certain hazardous wastes. In industry, one factory's hazardous waste can sometimes be another plant's raw material. For example, sulfuric acid is reclaimed from dozens of industrial processes. Some companies' only business is re-refining discarded solvents so they can be reused.

Many households recycle their newspapers and aluminum cans, and some household hazardous wastes can be recycled too. Used motor oil turned in at a collection center can be burned as fuel or re-refined for use as a lubricant. When a car battery is traded in instead of being tossed onto a junk heap, the lead in the battery can be recovered. Amateur photographers can run their used fixer through a cartridge that recovers the silver. They can sell the silver, and the silver—a toxic substance—doesn't get into the sewage.

Consumers can reduce the amount of waste they generate and do some recycling. All the other ways of dealing with household hazardous wastes require special expertise and facilities; they are not something consumers can do on their own. To be practical, these other methods require bringing together hazardous wastes from a large number of households, just as trucks collect trash or sewer systems collect toilet waste. Household hazardous-waste collection systems are needed.



Precautionary Statements
Hazards to Humans and Domestic Animals
 Caution: Harmful if swallowed, inhaled, or absorbed through the skin. Avoid breathing mist. Avoid contact with skin, eyes or clothing. Wash thoroughly after handling. Avoid contamination of food and foodstuffs. Do not use in edible product areas of food processing plants, restaurants, or other areas where food is commercially prepared or processed. Do not use in serving areas while food is exposed. Pets should be removed and fish aquariums covered or removed before treatment. Do not allow children to lie or sleep in treated areas until at least six hours following treatment.
Statement of Practical Treatment: If swallowed — call a physician or Poison Control Center immediately. Do not induce vomiting. Note to Physician: May present aspiration hazard. Airway should be administered only if symptoms of cholinesterase inhibition appear. If inhaled — remove victim to fresh air. Apply artificial respiration if indicated. If on skin — remove contaminated clothing and wash affected areas with soap and water. If in eyes — flush eyes with plenty of water. Get medical attention if irritation persists.
Physical or Chemical Hazards: Contents under pressure. Do not use or store near heat or open flames. Exposure to temperatures above 130°F may cause bursting. Do not puncture or incinerate.
Storage and Disposal: Do not store in water, food or feed by storage or disposal. Do not reuse empty container. Wrap container and put in trash collection.
 Seller makes no warranty, express or implied, concerning the use of this product other than indicated on the label. Buyer assumes all risk for use and handling of this material when such use and handling are contrary to label instruction.

DIRECTIONS for ANTS in Lawn and Ornamental Gardens
 Tear along perforations on bait containers as indicated and place bait containers within several inches of nest entrance. Additional bait may be scattered along ant trails and around the foundation of buildings. Repeat treatment as necessary.

PESTICIDE DISPOSAL: SECURELY WRAP ORIGINAL CONTAINER IN SEVERAL LAYERS OF NEWSPAPER AND DISCARD IN TRASH.

CONTAINER DISPOSAL: DO NOT REUSE BOX. DISCARD BOX IN TRASH.

CAUTION
 be harmful if swallowed or absorbed on the skin. Do not contaminate feed or furfs. Avoid prolonged skin contact. Wash thoroughly after using.
 if or reach of children and domestic animals.
 if not apply in areas accessible to children.
 9 occurs, get prompt medical aid.
 phone is antidote.
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Some hazardous wastes can be made harmless by treatment or much more easily or by other means. Different wastes usually require different treatments. Acids can be neutralized with bases. Potentials can be destroyed by chemical reactions.

Treatments rarely used in industry. Some industrial plants produce the same hazardous wastes every day. Being able to predict what the waste is and how much of it there will be makes it possible for the plant to build treatment facilities at the plant. In contrast, home household waste is an unpredictable mixture of substances. For that reason, it isn't usually possible to make home household hazardous wastes safe by treatment or by chemical or biological treatment.



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When it isn't technically or economically practical to handle a hazardous waste in any other way, it must be placed in a specially designed landfill.

The biggest difference between such hazardous-waste landfills and an ordinary sanitary landfill is the amount of care taken to prevent leachate—liquid that has trickled down though the waste, perhaps picking up toxic substances—from escaping into streams or groundwater.

A site is usually chosen away from heavily populated areas. It must be in an area that on average has not been flooded more often than once in a hundred years. Landfills may be built in an excavation or rest on the surface; in either case, the soil beneath the landfill should be heavy and resist the flow of water. The best sites have a thick natural layer of clay. The ground on which the landfill will rest is graded so that it slopes, and then it is carefully lined.

The Bottom Liner

The bottom liner consists of several layers. A waterproof sheet of thick plastic or rubber (A) is laid on top of the clay layer, and a layer of sand or gravel (C) is spread on top of the plastic. The gravel layer is for drainage. Sometimes perforated drain pipes are laid in the gravel, sloping down to a sump (B) at the lowest point in the layer. For safety's sake, the first drainage layer is then covered with a second: another sheet of plastic (D), and another layer of gravel and drainage pipes (E). To prevent small particles of dirt from clogging the drainage layers the second drainage layer is covered with a filter (F), which may be a layer of sand or a sheet of special fabric.

The bottom liner system minimizes the chance that leachate containing toxic substances will be released to the

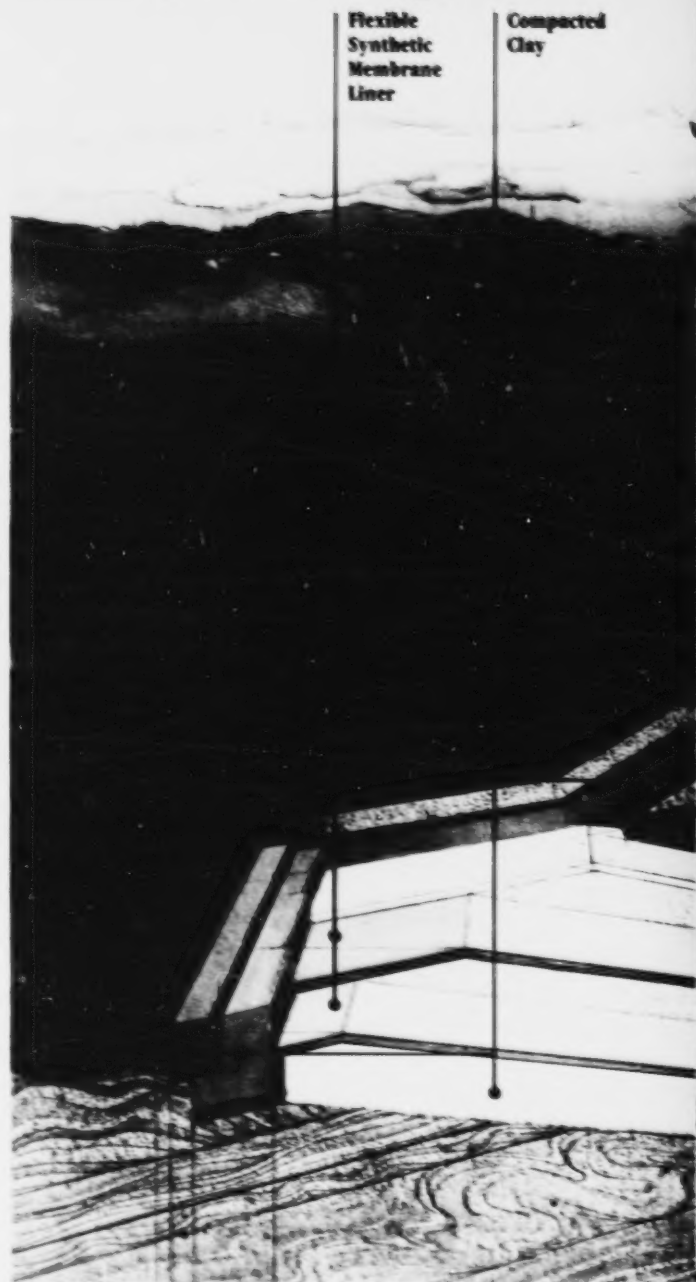
environment. Any liquids trickling down through the wastes will reach a drainage layer. Unable to penetrate the sheet of plastic, the liquids will flow through the drainage layer to the sump. From the sump, the liquids will be pumped to the surface for examination and treatment. Examining the leachate can reveal what's happening in the landfill even after it is full of waste.

Monitoring wells are drilled into aquifers around the landfill. Water from the wells will be tested regularly to see whether leachate has escaped from the landfill.

Sorting the Wastes

Wastes placed in a hazardous-waste landfill are not jumbled together as they are in a sanitary landfill. Instead, a technician sorts them into various groups. Each group includes only substances that will not react with one another. Thick earth walls (G) divide each layer of the landfill into separate compartments, and each compartment holds only one group of wastes. A record is kept showing exactly what wastes have been placed in each area. If a problem should arise years from now, this record will make it easier to find the area of the landfill that is responsible.

Liquid wastes are not accepted; they must be converted to solids. For convenience, some solid wastes (not

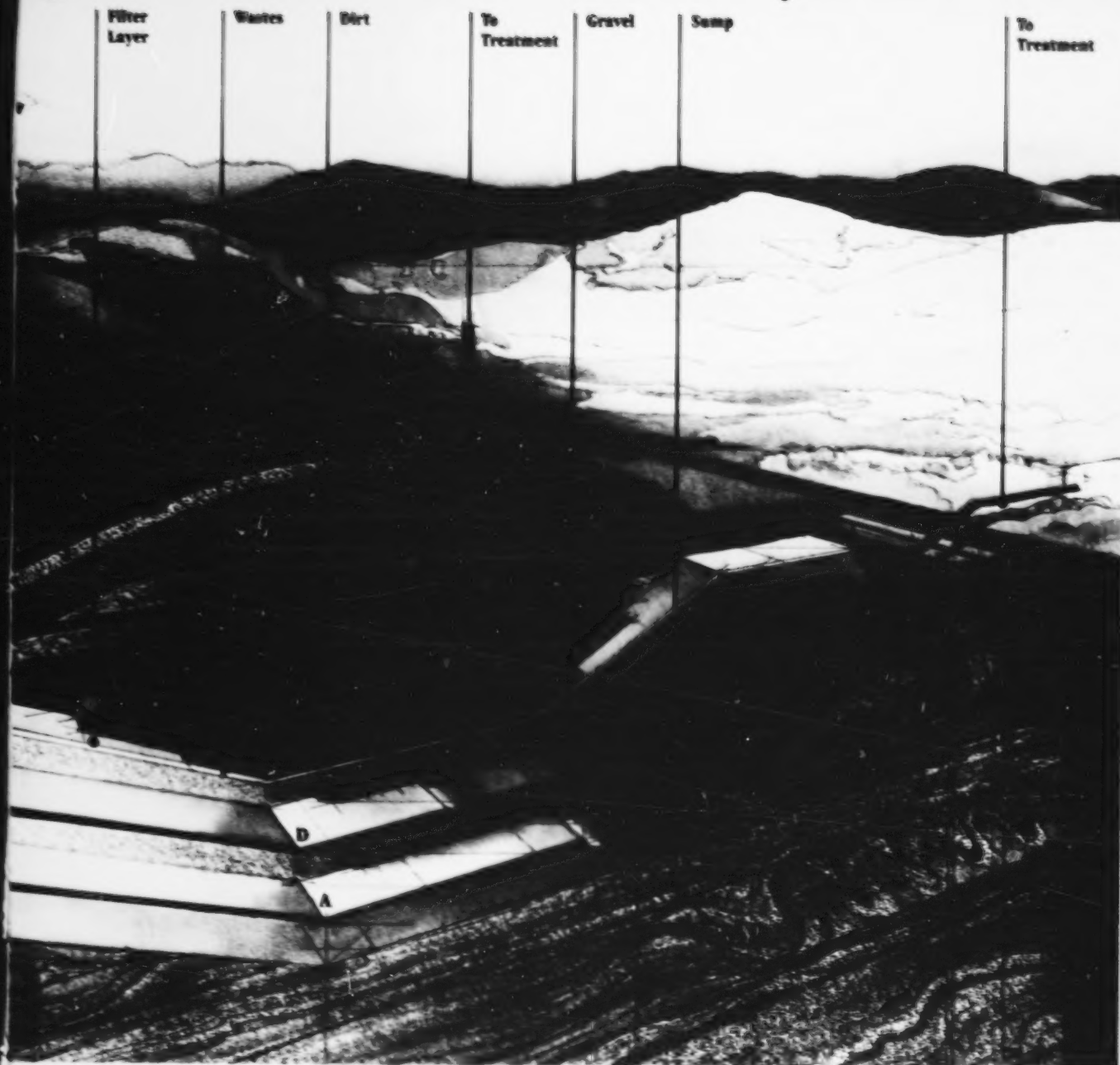


liquids!) may be handled in steel drums, but the drums are expected to rust. The landfill itself, not the drums, must be able to contain the drum's contents.

Capping the Landfill

While the landfill is in operation and wastes are still being added, rain falling on the

site can run down through the wastes. The bottom liner traps this water, and it collects in the sump and is treated. Once as much waste as the landfill will hold has been put in it, it is covered by a layer of water-resistant clay (H), and the clay is covered with another sheet of waterproof plastic or rubber (I). This covering prevents rainwater from getting



into the wastes. Gravel (J) is spread over the plastic, and then topsoil. Vegetation is planted to hold the soil in place.

Liquid may continue to collect in the sump for a few years after the landfill has been capped, as the wastes dry out. This leachate is removed and treated. After that no leachate should reach the sump; if any does, the top

cover may have a leak and must be repaired.

The site of the landfill is closed forever to further development. No houses or other buildings will ever be erected here. It is a cemetery for hazardous wastes.

Federal law now requires that all newly constructed hazardous-waste landfills be similar to the one described

above, but in 1985 only a few sites fit the new descriptions. Most operating hazardous-waste landfills, though much better sealed than the typical municipal landfill, lacked one or more of the features described.

Obviously, building and operating a hazardous-waste landfill is much more expensive than running a sanitary landfill,

and astronomically more expensive than running a dump. Another challenge is where to locate it. Most people want the benefits that come from using the products that create hazardous waste, but they also don't want a hazardous-waste management facility near their community. Unfortunately, there is no place that isn't somebody's backyard.

Disposing of hazardous wastes on your own would be very difficult.

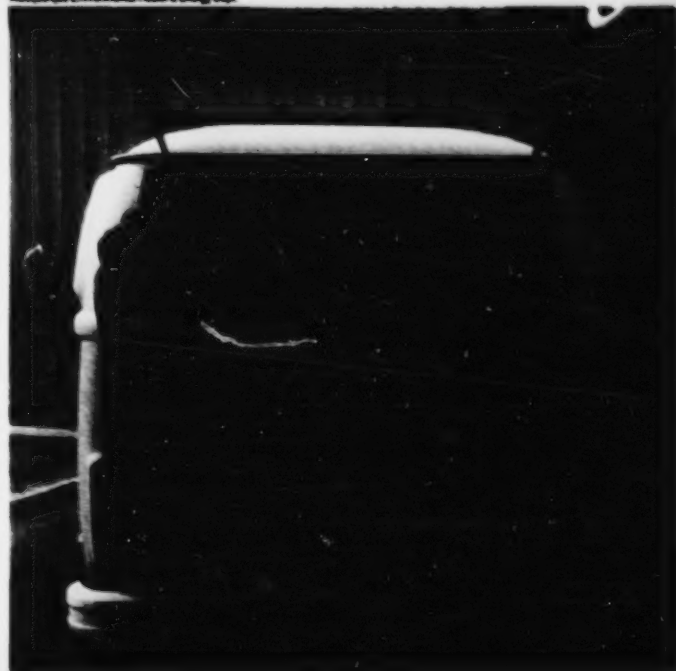
But it could also be difficult to dispose of toilet wastes on your own. Working together, the people in a community can plan and create good systems for managing hazardous household wastes.

Collecting the wastes is the most visible part of a community's household hazardous-waste system. In the past few years, more and more communities have been holding special Hazardous Waste Days. On these days householders can bring their hazardous wastes to a central location. A chemist or technician is on hand to sort the wastes, usually into steel drums. At the end of the day, the drums are labeled, sealed,

and carried off by a licensed hazardous-waste transporter to a licensed hazardous-waste management facility, where the waste may be recycled, treated, or buried in a hazardous-waste landfill.

Most communities, however, still have no hazardous-waste program at all. The people of the community are left on their own—and we know that doesn't work.

Michigan Environmental Health & Energy Dept.



How to Set Up a Program

Several of the best household hazardous-waste programs started with one person's concern. Here are some ways you can help with your community's hazardous household wastes:

Let local and regional officials know you're concerned.

Form a local or regional committee. Approach organizations as well as individual citizens:

—Community groups are a good way to spread information and muster volunteer help.

—Local industries have often provided financial and moral support as well as technical expertise.

—Service organizations often know how to build community support behind a new program.

Funds must be raised. It costs money to educate the public about a program and the need for it, and a licensed hazardous-waste firm must be paid to handle the wastes.

Contact your state hazardous-waste agency. Besides knowing the rules and regulations, they may have other essential information, such as sources of state matching funds or the names of companies licensed to handle hazardous wastes.

Locate local organizations that accept particular household hazardous wastes for recycling and publicize them. These might include gas stations that accept waste oil; theatre groups who will take leftover paint; hospital and hearing aid centers that accept dead hearing aid batteries; dentists who will take waste mercury, and so on.

Don't waste your energy reinventing the wheel; learn how other communities did it. Write or phone for information from such sources as:

Citizens for a Better Environment:
111 King Street, Madison, WI 53703;
(608) 257-2804.

Golden Empire Health Planning Center: 2100 21st Street, Sacramento, CA 95806; (916) 731-5050.

The League of Women Voters of Massachusetts: 8 Winter Street, Boston, MA 02108; (617) 357-6386.

METRO Seattle—Water Quality:
821 Second Avenue, Seattle, WA 98104;
(206) 447-5875.

Sierra Club: 530 Bush Street, San Francisco, CA 94108; (415) 961-8634.

Some professional groups, manufacturers, and trade associations can also provide useful literature on household hazardous wastes. Try:

American Chemical Society, Dept. of Public Affairs: 1155 16th Street NW, Washington, DC.

Chemical Specialties Manufacturers Association: Suite 1120, 1001 Connecticut Avenue, NW, Washington, DC 20036; (202) 872-8131.

Plan on a lot of advance planning. The process of finding a collection site and a licensed hazardous-waste contractor, and planning a public information program must begin at least half a year before the collection date you've selected.

Look for inexpensive ways of conducting a public information campaign. Leave notices on doorknobs; send home announcements with school children; make public service announcements for use on local TV and radio stations.

Early in the planning process, consider carefully how liability issues can be handled.

Don't allow your collection program to become a one-time effort; be looking for ways to institutionalize it.

People have solved waste problems before. Now our country has a new one. We can solve this one too, by working together to establish hazardous-waste systems that will protect us and the environment in which our great-great-grandchildren will live.

- **Think Before You Throw It Out!**
- **Read and Follow Label Directions!**

Except for medicines and a few pesticides, the best thing to do with any of the leftovers listed below is to give them to someone who can use them up.

Ideally, unused quantities of most of the products listed below should be turned over to a hazardous-waste collection program. However, because many communities don't yet provide this service, second-best options are sometimes described.

Hazardous wastes should never be poured into storm drains, or into any stream, river, or lake.

Which ways of handling a leftover will be acceptable in your community depends a great deal on local geology, climate, and ecosystem, as well as on human arrangements. In some localities with special problems, a separate sheet of advice will have been inserted into this booklet. Be sure to read that sheet before consulting the advice that follows.

What Kind of Sewer System Do You Have?

The single most important local condition is what sort of sewage system your drains lead to. Large city treatment plants are the most rugged. Suburbs or small towns sometimes use "packaged" treatment plants that are less able to cope with hazardous wastes. Most fragile of all is a septic tank (cesspool) system.

Septic tank systems are used by almost 30 percent of all Americans. The drains in their homes lead to a series of tanks, usually buried somewhere on the homesite. In these tanks solids settle out and bacteria begin the work of degrading most of the wastes. Liquid overflow from the tanks passes into a set of perforated pipes, from which it filters into the soil.

Pouring a hazardous waste down the drain in a home connected to a septic tank can have two harmful effects. First, some wastes can kill off the organisms in the septic tank that degrade wastes. Second, some hazardous wastes—certain toxic solvents, for example—pass through the system unchanged, and are discharged directly into the backyard soil. If your home is connected to a septic tank, you must be very cautious about what you pour into your drains.

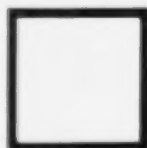
Air Pollution

Some of the advice suggests allowing solvents to evaporate. That is often preferable to pouring them down the drain, because as vapor they are diluted more quickly and many are destroyed by ultraviolet light. However, what may be acceptable in a rural area in the Great Plains would not be in a city with severe air pollution problems.

Explanation of the Symbols

Use these boxes to check which kinds of wastes you may produce in your own home.

Symbols are used to suggest what may be done with each kind of leftover. The red symbol indicates what NOT to do with the waste. Green symbols show what disposal strategies may be used. If there is more than one green symbol, the left-most symbol represents the best strategy, the next green symbol the second-best strategy, and so on.



Should not be placed in the trash. In particular, containers of liquid hazardous wastes, or aerosol cans that have not been completely emptied should never be placed in the trash.



Should not be poured down the drain.



Recycle the waste.



Give the waste to a hazardous-waste collection program.



Flush down the drain with lots of water (but take into account the kind of sewage system you are connected to).



Some household wastes react with each other, producing toxic gases. Do not flush hazardous materials down the drain one after the other. Do not use chlorine bleach, drain cleaners, or tile cleaners immediately before or after disposing of hazardous waste.

Place in the trash. Special treatment may be required before putting the waste in the trash; if so, the treatment is described in the paragraph below the names of the waste.



In the Garage or Workshop

Automotive Supplies



Used motor oil
Light lubricating oil
Automatic transmission fluid
Kerosene, lamp oil
Diesel fuel
Brake fluid:

Ask the gas station you use or the store where you buy auto supplies whether they accept labeled containers of old auto fluids. If they do not, get the address of an oil recycling station from the highway department, environmental organizations in the Yellow Pages, or your state environmental agency. Write the address of the waste-oil drop-off nearest you on the line below:

Only substances in the above list should be mixed with waste oil, since some contaminants make oil much more difficult to re-refine or burn.

To facilitate recycling, the EPA has exempted waste oil from certain hazardous-waste requirements. It is important not to add volatile wastes like naphtha, thinner, and gasoline to used oil, because increasing the ignitability of the waste oil causes it to lose its exemption, and thus raises the cost of handling it by twenty times or more.

If you cannot reach a recycling pickup point or hazardous-waste collection site, do not pour the oil on the ground or down the drain. Special waste-oil kits containing an absorbent can be purchased at some auto supply stores. Add the waste oil to the container in the kit, seal, and place in the trash. If you cannot find such a kit, pour the waste oil into a container of sawdust or cat litter, seal and discard.



Antifreeze, coolant:

The main ingredient tastes sweet but is poisonous; pets licking spills may die. Pour into a drain connected to a sewage treatment

plant with a great deal of water. If your home has a septic tank, don't pour more than one gallon of coolant per week down the drain, and greatly dilute it.

If the coolant has been used in an older car, one whose radiator is sealed with lead solder, it may contain dangerous levels of lead. Such coolant is best delivered to a hazardous waste collection program.



Gasoline:

Burn up uncontaminated gasoline in an engine. Contaminated gasoline is very difficult to dispose of, so use kerosene as a cleaner or solvent instead of gasoline.

Turn gasoline over to a hazardous-waste collection program as soon as possible. Storing gasoline at home is **EXTREMELY** dangerous. If you are determined to store gasoline, use only containers made for the purpose which include a flame arrestor (a fine wire mesh screen in the spout). Do not completely fill the container; leave air space for expansion. Cap all openings when not pouring.

Do not mix gasoline with waste oil.



Auto battery:

Trade in or take to a local battery shop for recycling.



Windshield washer solution concentrate

containing methyl alcohol: Flush down drain with water.



Engine degreaser

(containing petroleum solvents).

Carburetor cleaner

Car wax, chrome polish

containing petroleum distillates.

Give to a service station or high school auto shop class. If you cannot, deliver them to a hazardous waste collection center.



Auto body filler:

Mix resin and hardener; after hardening is complete, solid may be placed in trash.

Painting and Decorating Supplies.



Latex-base paint, other paint whose spills are cleaned up with water:

Give usable paint to schools, theatre groups, etc. If paint is unusable, remove lid and place can in a well-ventilated area (preferably outside) which children and pets cannot reach. After contents have solidified, replace the lid and place the can in the trash.



Oil-base paint, alkyd enamel, epoxy enamel, varnish, other paint whose spills must be cleaned up with thinner:

Give usable paint to schools, theatre groups, etc. If the paint is unusable and air pollution is not a problem where you live, follow the directions for latex-base paint, and in addition make sure the container is away from flames and sparks. If air pollution is a problem in your area, seal the can and hold for hazardous-waste collection.



Synthetic auto enamel, model airplane paint:
Hold for hazardous-waste collection.



Paint thinner, turpentine, mineral spirits:
Recycle thinner used to clean brushes by storing in a closed container until particles settle. Then filter and store in a separate metal or plastic container (not glass) for reuse. Store the sludge in a labeled jar for hazardous-waste collection.

Thinner may be mixed with oil-base paints when these are being taken for hazardous-waste collection.



Paint stripper:
containing lye (sodium hydroxide): Flush down the drain with lots of water. Use caution if you are connected to a septic tank or small suburban sewage system. Rinse the empty container before putting it in the trash. Do not get rinse water on your hands.



Paint stripper:
containing methylene chloride: Deliver to a hazardous-waste collection program.



Brush cleaners:
containing TSP: Flush down the drain with lots of water. Store the sludge for hazardous-waste collection.



Brush cleaners:
containing solvents: Strain and reuse, as described under "Paint Thinner." Store the sludge for hazardous waste collection..

Building and Woodworking Supplies.



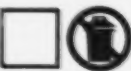
Mercury batteries:
(from smoke detectors):
Deliver to a hazardous-waste collection program.



Fluorescent lamp ballast:
Inside most fluorescent lamps is a black metal case called a ballast. Ballasts manufactured before 1978 are likely to contain an oily substance called PCB. Repeated exposure to PCB—or perhaps the dibenzofurans with which it is usually contaminated—can cause illness.

If a ballast being discarded does not bear a label stating it contains no PCBs, assume it does and deliver to a hazardous-waste collection program.

Ballasts sometimes develop leaks. Any liquid dripping from an overhead fluorescent fixture is probably from the ballast and may be PCB. Have an electrician replace the ballast. Using a polyethylene bag over your hand as a glove, clean up the spills with soapy water on paper towels. Holding the used towels and the ballast with the hand inside the bag, turn the bag inside out with your other hand, leaving the towels and ballast inside. Seal the bag. Wash your hands. Deliver the bag to a hazardous-waste collection program.



Broken smoke detectors
(ionization type):
Return to manufacturer or retailer. (Hazardous waste collection programs will not accept radioactive materials.) If the unit has been physically damaged—for example, inadvertently smashed by a ladder—pick it up with a hand in a plastic bag, turn the bag inside out, and seal the bag.



Wood preservatives:
Do NOT use up wood preservatives contain-

ing creosote or pentachlorophenol or arsenic. Deliver such leftover wood preservatives to a hazardous-waste collection program.



Wood that has been treated with preservative:
Scrap wood treated with wood preservative—including sawdust—is hazardous. Do not inhale the sawdust; do not burn the wood.



Glues and cements containing solvents other than water:
Give leftover glues to people who use the particular type of cement you have. If you live in an area where air pollution is not a problem, uncap the glue and allow it to harden in a well-ventilated area (preferably outdoors) away from flames or sparks, where children and animals can't get at it. Then discard in trash. Otherwise, hold for a hazardous-waste collection day.



Asbestos:
Do not attempt to remove building materials like duct wrapping yourself. Waste asbestos cannot be swept up or vacuumed up by home equipment, trying to do so only raises clouds of invisible asbestos dust.

Leftover household items containing asbestos, such as ironing board covers, should be placed in heavy plastic bags and put in the trash.

Garden Supplies.



Insecticide:
Follow the directions on the label! If you are not going to use up some insecticide and cannot give it to someone who will,

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**Rust remover***containing phosphoric acid***Aluminum cleaner***containing phosphoric acid:**Flush down the drain with lots of water; rinse container before discarding.***Swimming Pool Supplies.****Pool acid:***Deliver to a hazardous-waste collection program.***Pets, Hobbies, Toys.****Flea powder:***Treat like other insecticides (see Garden Supplies).***Chemistry sets:***Deliver to a hazardous-waste collection site. Many of the chemicals are not hazardous, but sorting them out requires special knowledge.***Ammunition, powder, primer:***Deliver to a fire or police station or county sheriff's office.**(Most hazardous-waste collection programs will not accept explosives.)***Gun cleaning solvent:***Deliver to a hazardous-waste collection program.***Antistatic brushes:***Return expired radioactive strip to manufacturer.**(Hazardous waste collection programs will not accept radioactive materials.)***Photographic chemicals***(unmixed):**Deliver selenium toners, bleaches containing sodium or potassium dichromate, ferricyanide or ferrocyanide to a hazardous-waste collection program.***Photographic solutions:***If you regularly develop a large number of color photographs or black and white prints, get publication J-52, "Disposal of Small Volumes of Photographic Processing Solutions." (Eastman Kodak, 343 State Street, Rochester, New York 14650.)***Ceramic glazes:***Glazes containing lead or uranium should be solidified by firing, then placed in the trash.***Artists' oils, acrylics:***Tubes containing most pigments can be slit, allowed to solidify, and then placed in the trash, but the following pigments should be delivered to a hazardous-waste collection program: antimony white; barium yellow; burnt umber; cadmium yellows, oranges, and reds; chrome yellow, orange, and green; cobalt violet (cobalt arsenate); emerald green or Paris green; flake white, mixed white, or lead white; lemon yellow; manganese blue and violet; molybdate orange; Naples yellow; thalo blues and greens; raw umber; Scheele's green; strontium yellow; vermilion; and zinc yellow.***Artists' mediums, thinners, fixatives:***Although some are nonhazardous, in general such leftovers should be delivered to a hazardous-waste collection program.***Rubber cement thinner:***Deliver to a hazardous-waste collection program.***Fiberglass resins, epoxy resins:***Mix resin and hardener; place in trash after they react and solidify. Unreacted resins or hardener should be delivered to a hazardous-waste collection program.***Aerosol cans of all types:***Only completely empty cans should be placed in the trash.**Even empty cans should not be placed in a trash compactor.**Prevent cans from becoming clogged by proper use. Before starting to spray, give the spray button a quarter turn. If a spray opening becomes clogged while the can is in use, turn it upside-down and spray for a few seconds. Always do this when you have finished painting.**If this does not work, pull the spray button from the can. There are two kinds of spray button: one has a stem attached to the button; in the other, the stem is attached to the can (don't try to pull it out!).**In either case, at the end of the stem is a slit. Clear the slit by running your fingernail through it.**Never try to clear the clog by pushing a pin or other sharp object into the spray button or valve.*

In The Kitchen

Food.



Extracts such as vanilla and peppermint
Hard liquor such as whiskey, gin, vodka, and rum:

These products are 35% alcohol or more. When they are poured down the drain, they should be diluted with lots of water.

Housecleaning Supplies.



Lye

Oven cleaner containing sodium hydroxide

Drain opener containing sodium hydroxide:

If you are connected to a large sewage system, these products may be flushed down the drain with lots of water. Rinse the empty container before putting it in the trash. Do not get rinse water on your hands. If you have a large leftover quantity of these products and are connected to a septic tank, either give the products to someone who can use them or take them to a hazardous waste collection site.



Rug cleaners containing solvents

Furniture polish containing petroleum distillate

Floor polish for wood floors containing solvent:

Deliver to a hazardous-waste collection program.



Metal polish containing petroleum distillates:

If air pollution is not a problem where you live, allow contents of container to solidify, then place in trash. Otherwise, deliver to hazardous-waste collection.



Cleaners containing ammonia:

Flush down the drain with lots of water. Be extremely careful not to mix ammonia-based cleaners and chlorine bleaches; a poisonous gas will be produced.



Aerosol cans of all types:

Only completely empty cans should be placed in the trash.

Laundry Supplies.



Chlorine bleach:

Flush down drain with lots of water. Never mix chlorine bleaches with cleaners containing ammonia.



Spot remover

Dry cleaning solvent for clothing:

If you cannot give leftovers to someone who can use them, deliver to a hazardous-waste collection program.



Moth balls, moth flakes
(naphthalene):

Deliver to a hazardous-waste collection program.

Miscellaneous.



Lighter fluid:

Deliver to a hazardous-waste collection program.

Butane lighters and cylinders

Propane cylinders:

Must be completely empty before being placed in the trash. Cylinders containing gas are considered explosives and may not be accepted at a hazardous waste collection site.



Lamp oil:

Can be mixed with used motor oil, as described under Automotive Supplies.



Shoe polish containing petroleum distillates:

Discard dried out cans.



Shoe dye:

Deliver to a hazardous-waste collection program.

In The Bathroom



Infectious wastes:

Certain serious diseases may produce infectious wastes. The doctor will tell you whether any wastes require special handling and what should be done with them.

Medical Supplies.



Expired prescriptions, other medicine:

Flush down the toilet. Rinse bottles and discard in trash. Antibiotics, however, should not be flushed into septic systems.



Shampoo for head lice containing the insecticide lindane:

Deliver to a hazardous-waste collection program.



Mercury from a broken thermometer:
A one-time exposure to a small amount of metallic mercury is not very dangerous, even if a child swallows it—but notify your doctor. However, regular exposure to mercury vapor can be very damaging, especially to toddlers who spend so much time at floor level. It is very important to recover as much of the mercury as possible.

Do not attempt to vacuum up the mercury. You may permanently contaminate the vacuum cleaner.

Remove rings and other metallic jewelry; mercury combines with many other metals on contact. Use a wooden toothpick or piece of cardboard to push the mercury droplets together and into a glass bottle. Pay special attention to rugs and cracks in the floor. Tightly cap the bottle, save it and turn it in at a hazardous-waste collection program or to your dentist's office. (Dentists recycle mercury.)



Hearing aid batteries:

These batteries often contain mercury or silver and should not be incinerated. Americans swallow about 600 of these batteries each year; if the battery becomes lodged in the intestine, serious illness may result. Most episodes involve small children, but adults have also mistaken a battery for tablets of medicine.

Store dead batteries out of the reach of children in a container that cannot be mistaken for a candy container. After a number have accumulated, drop them off at a hospital. Hospitals regularly return their dead batteries to the manufacturer for recycling (they get a few cents for each battery turned in). A few hearing aid centers also recycle batteries.



Rubbing alcohol:

Flush down the drain with lots of water.

Cosmetics.



Waving lotion in home

permanents

Relaxer in hair straighteners

Depilatory

Cuticle remover when these contain

sodium or potassium hydroxide, or thioglycolate.

Flush down drain with lots of water; rinse container before discarding.



Perfume, cologne, after shave, pre-shave for electric shavers:

These products contain a large percentage of alcohol. Pour down drain with a large amount of water.



Nail polish:

Remove cap and allow polish to solidify before placing in trash.



Nail polish remover:

Flush down the drain with lots of water.

Cleaners.



Tub, tile, shower stall cleaners

containing phosphoric acid:

Flush down the drain with lots of water. Rinse the empty container before putting it in the trash.



Disinfectant:

Small quantities may be flushed down the drain with lots of water (unless you are connected to a septic tank). Industrial strength disinfectants should be delivered to a hazardous-waste collection program.



Toilet bowl cleaner (sodium hydroxide type)

Flush down the drain with lots of water. Rinse the empty container before putting it in the trash; do not get the rinse water on your hands. If you are connected to a septic tank and have a lot of leftover cleaner which you have not been able to give to someone who could use it, take it to a hazardous waste collection site.

Enterprise for Education has used its best efforts to identify types of hazardous household wastes and to describe responsible, practical techniques for their disposal. The methods listed above have been reviewed by a variety of experts. However, the disposal of household hazardous wastes is a matter of controversy, and experts do not always agree. As a result we do not warrant or guarantee the accuracy or sufficiency of the information provided. It cannot be assumed that all potentially hazardous wastes have been identified or that all necessary precautions have been described. For the best current information, householders should contact their local environmental or public health agency.

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